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BAQ Engineering Services Division

Company Name	Work Space Projects, LLC	Permit Writer:	Wanda Parnell
Permit Number:	0900-0116-CA	Date:	DRAFT

EXPEDITED REVIEW: May 4, 2017 (An Expedited Review Request Form received on May 2, 2017 had the Minor Source box incorrectly checked.)

DATE APPLICATION RECEIVED: April 25, 2017 (An update was received on May 5, 2017.)

DATE OF OCRM APPROVAL: May 8, 2017

FACILITY DESCRIPTION

Work Space Projects, LLC is a new facility that will manufacture aluminum die castings.

PROJECT DESCRIPTION

This Department has received a construction permit application for the construction of a new die cast facility which will be located in the Ridgeville Industrial Campus on Highway 78. Emissions will include criteria air pollutants, VOCs, HAPs, and TAPs.

Process Description and Equipment

There are two separate die casting production lines that will be in operation at this facility, the High Pressure Die Cast Process and the Gravity Die Cast Process. A detailed description of the processes of each line is given below.

Production Line for High Pressure Die Cast (HPDC)

- **Melting:** Aluminum alloy ingots that are received at the facility are melted down for casting during the melting process. For the HPDC Process, there will be two (2) ADC12 Melt Furnaces. Each furnace is equipped with four (4) 2.2 million BTU/hr natural gas burners for a total capacity of 8.8 million BTU/hr per furnace. The melting furnaces are equipped with a central baghouse to control particulate matter from the charging of the furnace and the degasification process. Molten aluminum is transferred to a bull ladle prior to degasification.
- **Degasification:** Molten aluminum is very absorbent of H_2 , so when it comes in contact with moist air, the water decomposes to release hydrogen in the melt. Excessive quantities of this dissolved gas have a well-documented detrimental effect on the mechanical properties of the final aluminum castings. The ability to degas molten aluminum is generally accomplished by using an inert purge gas, typically introduced into the melt by a rotary degassing unit. When purge gas bubbles are introduced to the melt, they collect hydrogen as they float toward the surface. These hydrogen-saturated bubbles leave the melt and reduce hydrogen levels. The melting furnaces are equipped with a central baghouse to control particulate matter from the charging of the furnace and the degasification process.
- **High Pressure Die Cast (HPDC):** In the HPDC Process, molten aluminum is formed using six (6) HPDC machines. In these machines, the aluminum is forced into a high grade steel tool at high speed and pressure. A die lube will be utilized in the steel dies. The HPDC machines will be equipped with oil mist collectors to control oil mist inside the facility and to maintain good internal housekeeping. There will be no discharge to the outside.
- **Fettling/Scrap:** After die casting, the crude castings go to fettling. Raw castings often contain irregularities caused by seams and imperfections in the molds. The process of cutting, grinding, shaving or sanding away these unwanted bits is called "fettling". It is the process in which the castings are made sure to meet all the standards required for the piece. The scrap is collected so it can be sent back to the melting process. There are not expected to be any emissions associated with the fettling process.
- **HPDC Shot Blasting:** Shot blasting is the process in which the castings are cleaned, strengthened and polished. For the HPDC process, there are six (6) shot blast stations (one for each HPDC machine), each equipped with their own baghouse. The exhaust from each of the HPDC shot blast baghouse filters will exhaust inside the building. The



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baghouse filter is integral to the shot blast machine. The shot blast will not operate if the baghouse filter is not functioning.

- **Machining:** In the Machining Process, final changes and touches are made to the castings before they are packaged and shipped. There are not expected to be any emissions associated with the machining process.

- **Packaging:** Finished castings are packaged and prepared for shipment.

Production Line for Gravity Semi-Permanent Mold (GSPM) Die Cast

- **Melting:** Aluminum alloy ingots that are received at the facility are melted down for casting during the melting process. Melting for the GSPM Process is done by four (4) melting furnaces. Each melting furnace is equipped with one (1) 1.0 million BTU/hr natural gas burner. The melting furnaces are equipped with a central baghouse to control particulate matter from the charging of the furnace and the degasification process. Molten aluminum is transferred to a bull ladle prior to degasification.

- **Degasification:** Molten aluminum is very absorbent of H_2 , so when it comes in contact with moist air, the water decomposes to release hydrogen in the melt. Excessive quantities of this dissolved gas have a well-documented detrimental effect on the mechanical properties of the final aluminum castings. The ability to degas molten aluminum is generally accomplished by using an inert purge gas, typically introduced into the melt by a rotary degassing unit. When purge gas bubbles are introduced to the melt, they collect hydrogen as they float toward the surface. These hydrogen-saturated bubbles leave the melt and reduce hydrogen levels. The melting furnaces are equipped with a central baghouse to control particulate matter from the charging of the furnace and the degasification process.

- **Sand Core Production:** Sand cores are used in the GSPM Die Cast Process and are produced at the facility as well. In this process, sand and resin are formed into molds for the gravity die casting process. Casting sand is blown into a three-dimensional pattern, which forms the part cavity and the channels through which the metal will flow. Initially, sand will be received in bags, however, when production increases the facility proposes to receive and store sand in a dedicated sand silo that will be equipped with a bin filter to control particulate emissions. The sand core production process emissions will be controlled by a scrubber and baghouse.

- **Gravity Semi-Permanent Mold (GSPM) Die Cast:** The GSPM process will use three (3) GSPM die cast machines. In the GSPM Die Cast Process, molten aluminum is formed using gravity and sand core molds. Molten aluminum is poured by gravity into permanent molds with sand core inserts to form the specified part. The sand core is removed from the aluminum casting. The destroyed sand cores will be collected for proper disposal.

- **Fettling/Scrap:** After die casting, the crude castings go to fettling. Raw castings often contain irregularities caused by seams and imperfections in the molds. The process of cutting, grinding, shaving or sanding away these unwanted bits is called "fettling". It is the process in which the castings are made sure to meet all the standards required for the piece. The scrap is collected so it can be sent back to the melting process. There are not expected to be any emissions associated with the fettling process.

- **Heat Treatment:** Castings that are formed using the GSP method must undergo heat treatment to strengthen the castings. The Heat Treatment process is equipped with an electric burner. Therefore, there will be no emissions associated with fuel combustion.

- **GSPM Shot Blasting:** Shot blasting is the process in which the castings are cleaned, strengthened and polished. For the GSPM process, there is one central shot blast equipped with a baghouse filter. The exhaust from shot blast baghouse filter will exhaust inside the building. The baghouse filter is integral to the shot blast machine. The shot blast will not operate if the baghouse filter is not functioning.

- **Machining:** In the Machining Process, final changes and touches are made to the castings before they are packaged and shipped. There are not expected to be any emissions associated with the machining process.



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- **Packaging:** Finished castings are packaged and prepared for shipment.

Note: The facility has requested that the integral baghouse filters (Control device IDs HP-BH1 through HP-BH6) be considered inherent to the shot blast process. The facility has considered the three questions below in making their determination and has provided the following responses.

1. Is the primary purpose of the equipment to control air pollution? *This dust control system is used to control indoor air pollution based on OSHA requirements for worker protection, as well as for housekeeping purposes, as this process vents inside the building. Additionally, per the National Fire Protection Association regulations, the facility will utilize a wet dust collection system to minimize fire and explosion hazards.*
2. Where the equipment is recovering product, how do the cost savings from the product recovery compare to the cost of the equipment? *This control device does not recover product for reuse or recycling. The material collected in this control system will have to be removed from the site and disposed of properly. A vendor will most likely be hired to remove and dispose of this material.*
3. Would the equipment be installed if no air quality regulations were in place? *The control device equipment would be installed if no air quality regulations were in place because it is necessary for worker protection as well as housekeeping purposes. Additionally, this control system is installed such that the shot blast cannot operate if the control device is not operating. There will be a hard wire control interlock to ensure this.*

Based on the above analysis, the Department does not concur that the baghouses are inherent to the process. Accordingly, the Department has included uncontrolled emission rates for Equipment IDs HPSB-1 through HPSB-6 to the emissions table and updated the facility wide emission rates for PM, PM₁₀, and PM_{2.5}. Despite this conclusion, no new state or federal regulations are triggered.

EMISSIONS

UNCONTROLLED POTENTIAL EMISSIONS (PROJECT ONLY)				
Equipment ID	Pollutant	lb/hr	TPY	Method for Estimating Emissions
ADC12-1, ADC12-2 (fuel combustion, each furnace)	PM	6.49E-02	0.28	AP 42, 5 th edition, Vol I, Table 1.4-2, 07/1998 Update (EF=7.6 lb/10 ⁶ scf)
	PM ₁₀	6.49E-02	0.28	AP 42, 5 th edition, Vol I, Table 1.4-2, 07/1998 Update (EF=7.6 lb/10 ⁶ scf)
	PM _{2.5}	6.49E-02	0.28	AP 42, 5 th edition, Vol I, Table 1.4-2, 07/1998 Update (EF=7.6 lb/10 ⁶ scf)
	CO	7.18E-01	3.14	AP 42, 5 th edition, Vol I, Table 1.4-1, 07/1998 Update (EF=84 lb/10 ⁶ scf)
	SO ₂	5.13E-03	0.02	AP 42, 5 th edition, Vol I, Table 1.4-2, 07/1998 Update (EF=0.6 lb/10 ⁶ scf)
	NO _x	4.27E-01	1.87	AP 42, 5 th edition, Vol I, Table 1.4-1, 07/1998 Update (EF=50 lb/10 ⁶ scf)
	VOC	4.70E-02	0.21	AP 42, 5 th edition, Vol I, Table 1.4-2, 07/1998 Update (EF=5.5 lb/10 ⁶ scf)
	Total HAP	---	7.38E-02	AP 42, 5 th edition, Vol I, Table 1.4-3, 07/1998 Update



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UNCONTROLLED POTENTIAL EMISSIONS (PROJECT ONLY)				
Equipment ID	Pollutant	lb/hr	TPY	Method for Estimating Emissions
ADC12-1, ADC12-2 (charging, each furnace)	PM	4.18	18.31	AP 42, 5 th edition, Vol I, Table 12.8-2, 10/1986 Update (EF=1.9 lb/ton metal charged)
	PM ₁₀	4.18	18.31	AP 42, 5 th edition, Vol I, Table 12.8-2, 10/1986 Update (EF=1.9 lb/ton metal charged)
	PM _{2.5}	4.18	18.31	AP 42, 5 th edition, Vol I, Table 12.8-2, 10/1986 Update (EF=1.9 lb/ton metal charged)
	SO ₂	4.4E-02	0.19	EPA WebFIRE (EF=0.02 lb/ton metal charged)
	NO _x	2.2E-02	0.10	EPA WebFIRE (EF=0.01 lb/ton metal charged)
	VOC	3.08E-01	1.35	EPA WebFIRE (EF=0.14 lb/ton metal charged)
GM-1, GM-2, GM-3, GM-4 (fuel combustion, each furnace)	PM	7.38E-03	0.03	AP 42, 5 th edition, Vol I, Table 1.4-2, 07/1998 Update (EF=7.6 lb/10 ⁶ scf)
	PM ₁₀	7.38E-03	0.03	AP 42, 5 th edition, Vol I, Table 1.4-2, 07/1998 Update (EF=7.6 lb/10 ⁶ scf)
	PM _{2.5}	7.38E-03	0.03	AP 42, 5 th edition, Vol I, Table 1.4-2, 07/1998 Update (EF=7.6 lb/10 ⁶ scf)
	CO	8.16E-02	0.36	AP 42, 5 th edition, Vol I, Table 1.4-1, 07/1998 Update (EF=84 lb/10 ⁶ scf)
	SO ₂	5.83E-04	0.003	AP 42, 5 th edition, Vol I, Table 1.4-2, 07/1998 Update (EF=0.6 lb/10 ⁶ scf)
	NO _x	4.85E-02	0.21	AP 42, 5 th edition, Vol I, Table 1.4-1, 07/1998 Update (EF=50 lb/10 ⁶ scf)
	VOC	5.34E-03	0.02	AP 42, 5 th edition, Vol I, Table 1.4-2, 07/1998 Update (EF=5.5 lb/10 ⁶ scf)
	Total HAP	---	8.38E-03	AP 42, 5 th edition, Vol I, Table 1.4-3, 07/1998 Update
GM-1, GM-2, GM-3, GM-4 (charging, each furnace)	PM	4.75E-01	2.08	AP 42, 5 th edition, Vol I, Table 12.8-2, 10/1986 Update (EF=1.9 lb/ton metal charged)
	PM ₁₀	4.75E-01	2.08	AP 42, 5 th edition, Vol I, Table 12.8-2, 10/1986 Update (EF=1.9 lb/ton metal charged)
	PM _{2.5}	4.75E-01	2.08	AP 42, 5 th edition, Vol I, Table 12.8-2, 10/1986 Update (EF=1.9 lb/ton metal charged)
	SO ₂	5.00E-03	0.02	EPA WebFIRE (EF=0.02 lb/ton metal charged)
	NO _x	2.5E-03	0.01	EPA WebFIRE (EF=0.01 lb/ton metal charged)
	VOC	3.5E-02	0.15	EPA WebFIRE (EF=0.14 lb/ton metal charged)
SCR-1	PM	108.00	4.50	AP 42, 5 th edition, Vol I, Table 12.10-7, 01/1995 Update (EF= 3.6 lb/ton for PM) MI DEQ MAERS Emission Factor Table (EF=0.54 lb/ton for PM ₁₀) Material Balance Assume PM ₁₀ = PM _{2.5} .
	PM ₁₀	16.20	0.68	
	PM _{2.5}	16.20	0.68	
SCP-1	PM	7.04	30.84	AP 42, 5 th edition, Vol I, Table 12.10-7, 01/1995 Update



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UNCONTROLLED POTENTIAL EMISSIONS (PROJECT ONLY)

Equipment ID	Pollutant	lb/hr	TPY	Method for Estimating Emissions
	PM ₁₀	7.04	30.84	(EF=1.1 lb/ton) Material Balance Assume all PM equal
	PM _{2.5}	7.04	30.84	
	VOC	6.41	28.08	Engineering Calculations
	HAP	2.40	10.53	
HPSB-1, HPSB-2, HPSB-3, HPSB-4, HPSB-5, HPSB-6 (each)	PM	0.042	0.185	AP 42, 5 th edition, Vol I, Table 13.2.6-1, 10/1997 Update (EF=0.69 lb/1,000 lb abrasive) Material Balance
	PM ₁₀	0.042	0.185	
	PM _{2.5}	0.042	0.185	

CONTROLLED POTENTIAL EMISSIONS (PROJECT ONLY)

Equipment ID	Pollutant	lb/hr	TPY	Method for Estimating Emissions
ADC12-1, ADC12-2 (charging, each)	PM	4.18E-02	0.183	99% control efficiency
	PM ₁₀	4.18E-02	0.183	
	PM _{2.5}	4.18E-02	0.183	
GM-1, GM-2, GM-3, GM-4 (each)	PM	4.75E-03	0.021	99% control efficiency
	PM ₁₀	4.75E-03	0.021	
	PM _{2.5}	4.75E-03	0.021	
HPSB-1, HPSB-2, HPSB-3, HPSB-4, HPSB-5, HPSB-6 (each)	PM	4.23E-04	1.85E-03	99% control efficiency
	PM ₁₀	4.23E-04	1.85E-03	
	PM _{2.5}	4.23E-04	1.85E-03	
GSB-1	PM	5.77E-04	2.53E-03	AP 42, 5 th edition, Vol I, Table 13.2.6-1, 10/1997 Update (EF=0.69 lb/1,000 lb abrasive) Material Balance
	PM ₁₀	5.77E-04	2.53E-03	
	PM _{2.5}	5.77E-04	2.53E-03	
SCR-1	PM	0.11	4.50E-03	99.9% control efficiency
	PM ₁₀	1.62E-02	6.75E-04	
	PM _{2.5}	1.62E-02	6.75E-04	
SCP-1	PM	7.04E-02	3.08E-01	99% control efficiency
	PM ₁₀	7.04E-02	3.08E-01	
	PM _{2.5}	7.04E-02	3.08E-01	
	VOC	0.96	4.21	Engineering Calculations
	HAP	0.36	1.58	



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FACILITY WIDE EMISSIONS		
Pollutant	Uncontrolled Emissions	Controlled/Limited Emissions
	TPY	TPY
PM	82.082	0.776
PM ₁₀	78.257	0.772
PM _{2.5}	78.257	0.772
CO	7.716	7.716
SO ₂	0.528	0.528
NO _x	4.593	4.593
VOC	31.893	4.212
Total HAP	10.529	1.579
HAP (Single greatest - Methanol 67-56-1)	10.529	1.579

OPERATING PERMIT STATUS

This is a new facility. With the construction of this project, the facility will become a potentially major source for HAP emissions, but it has requested federally enforceable emission limitations of less than 10 TPY single HAP and less than 25 TPY combination HAP to avoid Title V and MACT major source status. The facility will be requesting a new Conditional Major Operating Permit.

REGULATORY APPLICABILITY REVIEW				
Regulations	Comments/Periodic Monitoring Requirements			
Section II.E – Synthetic Minor	(Applicable) The facility will have the PTE greater than 10 TPY single HAP (methanol). However, the facility has requested a federally enforceable emission limitation of less than 10/25 TPY HAP to avoid TV and MACT.			
Standard No. 1	(Applicable) The following fuel burning operations (burners only) have PM, SO ₂ , and 20% opacity limits imposed by this standard.			
	Equip ID	PM Allowable 0.6 lb/10 ⁶ BTU, each (lb/hr)	SO ₂ Allowable 2.3 lb/10 ⁶ BTU, each (lb/hr)	Uncontrolled Emissions (lb/hr)
				PM SO ₂
				6.49E-02 5.13E-03
	GM-1, GM-2, GM-3, GM-4	0.6	2.3	4.75E-01 5.00E-03
Monitoring will consist of burning natural gas only.				
Standard No. 3 (state only)	(Not Applicable) The new processes will not burn any waste.			
Standard No. 4	(Applicable) The proposed processes below will have an opacity limit (including any fugitives) of 20%, each and a particulate matter (PM) allowable emissions rate (based on a process weight rate in tons per hour) imposed by this standard.			



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REGULATORY APPLICABILITY REVIEW

Regulations	Comments/Periodic Monitoring Requirements					
		Equipment ID	Allowable PM Emissions, each (lb/hr)	Process Weight Rate, each (ton/hr)	Uncontrolled PM Emissions, each (lb/hr)	Controlled PM Emissions, each (lb/hr)
		ADC12-1, ADC12-2	6.954	2.2	4.18	4.18E-02
		GM-1, GM-2, GM-3, GM-4	2.577	0.5	4.75E-01	4.75E-03
		HPSB-1, HPSB-2, HPSB-3, HPSB-4, HPSB-5, HPSB-6	3.331	0.73	---	4.23E-04
		GSB-1	4.10	1.0	---	5.77E-04
		SCR-1	40.036	30.0	108.00	0.11
		SCP-1	2.005	0.34	7.04	7.04E-02
		Monitoring will consist of daily recordkeeping of pressure drop and pH readings and weekly inspection of the baghouse system and scrubber. The control devices must be in operation when the processes are running, except during periods of baghouse filter malfunction or mechanical failure.				
Standard No. 5	(Not Applicable) This is a new facility and thus, not in existence in 1979 or 1980. Additionally, none of the processes is an affected source.					
Standard No. 5.2	(Not Applicable) The proposed melt furnaces will utilize natural gas burners that will be less than 10 million BTU/hr, each.					
Standard No. 7	(Not Applicable) Aluminum die casting is not one of the 28 source categories and is therefore subject to the 250 TPY major source threshold. This facility does not have the PTE greater than 250 TPY of any regulated pollutant.					
61-62.6	(Applicable) This facility will apply best practices to minimize fugitive PM emissions.					
40 CFR 60 and 61-62.60	The proposed processes do not fall into any of the specific source categories. (Not Applicable) The requirements of Subpart S <i>Standards Of Performance For Primary Aluminum Reduction Plants</i> apply to any facility manufacturing aluminum by electrolytic reduction. The facility is not a primary aluminum reduction plant.					
40 CFR 61 and 61-62.61	(Not Applicable) None of the processes or operations apply.					



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Regulations	Comments/Periodic Monitoring Requirements
40 CFR 63 and 61-62.63	<p>The proposed facility will have the PTE greater than 10 TPY single HAP (methanol). However, the facility has requested a federally enforceable emission limitation of less than 10/25 TPY HAP to avoid TV and MACT. The proposed facility will be an area source of HAP emissions and the proposed processes do not fall under any area source categories.</p> <p>(Not Applicable) The requirements of Subpart LL <i>NESHAP For Primary Aluminum Reduction Plants</i> apply to any facility manufacturing aluminum by electrolytic reduction at a major source as defined in §63.2. This facility is not a primary aluminum reduction plant.</p> <p>(Not Applicable) The requirements of Subpart RRR <i>NESHAP For Secondary Aluminum Production</i> do not apply to manufacturers of aluminum die castings, aluminum foundries, or aluminum extruders that melt no material other than clean charge and materials generated within the facility; and that also do not operate a thermal chip dryer, sweat furnace or scrap dryer/delacquering kiln/decoating kiln. This is an aluminum die casting facility as defined by the NAICS Code 331523 and will only melt clean charge and materials generated within the facility. In addition, the requirements of this subpart apply to specific affected sources located at a secondary aluminum production facility that is a major source of HAPs.</p> <p>(Not Applicable) Subpart TTTTTT <i>NESHAP For Secondary Nonferrous Metals Processing Area Sources</i> applies to owners or operators of a secondary nonferrous metals processing facility that is an area source of HAP. This facility does not meet the definition of a secondary nonferrous metals processing facility as defined in §63.11472.</p> <p>(Not Applicable) Subpart ZZZZZZ <i>NESHAP: Area Source Standards For Aluminum, Copper, and Other Nonferrous Foundries</i> applies to owners or operators of an aluminum foundry, copper foundry, or other nonferrous foundry that is an area source of HAP emissions and that meets the criteria specified in §63.11544(a)(1)-(4). As defined in §63.11556, aluminum foundry means a facility that melts aluminum and pours molten aluminum into molds to manufacture aluminum castings (except die casting) that are complex shapes. Die casting means operations classified under the NAICS codes 331521 (now 331523) (Aluminum Die Casting Foundries) and comprises establishments primarily engaged in introducing molten aluminum under high pressure, into molds or dies to make die castings. The proposed facility is a die casting facility that falls under NAICS code 331523.</p>

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Regulations	Comments/Periodic Monitoring Requirements
61-62.68	(Not Applicable) This facility will not store or use chemicals subject to 112(r) in excess of the threshold quantities.
40 CFR 64 (CAM)	(Not Applicable) The facility will not have any emission units that are major sources with control devices.

AMBIENT AIR STANDARDS REVIEW

Regulations	Comments/Periodic Monitoring Requirements
Standard No. 2	(Applicable) The controlled emission rates for each emission source are less than 1.14 lb/hr each and therefore, are exempt from modeling. The following operational restriction has been established to ensure compliance with the emission rates and to avoid modeling requirements: Each baghouse is required to be in place and operational whenever processes controlled by it are running, except during periods of baghouse filter malfunction or mechanical failure. See Modeling Summary dated 05/12/2017.
Standard No. 7.c	(Not Applicable) The PSD minor source baseline dates for Dorchester County are 01/26/2016 for PM _{2.5} , 06/05/1981 for PM ₁₀ , 11/30/1977 for SO ₂ , and 01/25/2006 for NO ₂ . All pollutants for each new emission source are less than 1.14 lb/hr (each) and thus, are exempt from modeling. See Modeling Summary dated 05/12/2017.
Standard No. 8 (state only)	(Applicable) Emissions from the proposed Sand Core Production process will include TAPs. TAP emissions from the process are below the de minimis threshold for the expected TAP, methanol. TAP emissions from burning virgin fuel are exempt from this standard. Therefore, dispersion modeling is not required to demonstrate compliance with this standard. See Modeling Summary dated 05/12/2017.

PUBLIC NOTICE

This construction permit(s) will undergo a 30-day public notice period to establish synthetic minor limits in accordance with SC Regulation 61-62.1, Section II.N. The comment period was open from June 13, 2017 to July 12, 2017 and was placed on the BAQ website during that time period.

SUMMARY AND CONCLUSIONS

It has been determined that this source, if operated in accordance with the submitted application, will meet all applicable requirements and emission standards.